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14 December 1981

CHINA REPORT SCIENCE AND TECHNOLOGY

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FIRST SYMPOSIUM ON CHEMICAL MINERAL PROCESSING

Beijing YOUSE JINSHU (NONFERROUS METALS) in Chinese No 4, 1981 pp 75-76

[Text]

The First Symposium on Chemical Mineral Processing, sponsored by the Mineral Processing Institution, Chinese Society of Metals, was held on May 5-9, 1981, at Daye Nonferrous Metals Company, Hubei Province, China. At the Symposium were present 112 people, representing 64 organizations under the Ministry of Metallurgical Industry, Chinese Academy of Sciences, Second Ministry of Machine-Building Industry, Ministry of Geology and Ministry of Chemical Industry.

For the meeting were prepared 66 papers, which were all read out and discussed at the general or panel sessions respectively. In the meantime the attendants visited the Tonglushan concentrator and its pilot plant for chemical mineral processing. Seminars were organized for discussing the problems of beneficiation of Tonglushan oxide ores, some constructive suggestions being put forward.

At the symposium research results in the field of chemical ore treatment acquired since liberation were reviewed, and directions in its development in China in the years to come were discussed. All this should play a positive role in developing the research and practice of refractory ore beneficiation in China.

Some progress in chemical mineral processing can be drawn from the papers presented to the symposium as follows.

1. Refractory oxidized copper ores For treating these ores the process of segregation followed by flotation has been studied widely and intensively; experiments have been run on the ores from more than a dozen deposits, among which ores from four deposits subjected to pilot scale tests, and at Shilu copper mine, Guangdong Province, this process for treating oxidized copper ores has been in commercial operation for years. The technology of leaching-extraction-electrowinning, commercially used abroad, has also been studied and practiced at home, and a series of full scale and pilot scale experiment results achieved, thus having laid the foundation for its commercial application. The new technology of leaching-precipitation-carrier flotation, successfully tested recently, has been verified in continuous experiments. New progress has been made in biological leaching copper ores. SO_2 leaching under atmospheric pressure and room temperature, flotation of leached residue, hot water sulphidization-flotation, ammonia leaching-sulphidization-flotation and other processes have all been investigated by the organizations concerned.

2. **Refractory complex ores** Rough concentrates are produced by conventional beneficiation process from refractory ores containing W, and W, Ta, Nb, and qualified products yielded by hydrometallurgical treatment of these concentrates. Co, Mn and Ni are recovered by FeSO_4 heap leaching the lean manganese nodules from lake bottom. Blast furnace pellets can be produced by double chloridizing roasting of complex limonite ores containing other metals, and the by-products such as Cu, Pb, Zn recovered as well. Selective chlorination of the same ores can recover the associated metals such as W, Cu, Pb, Zn, Bi, etc. as well as yield high-quality iron concentrate. The dithionate process for treating Ni-containing manganese ore, chloride or dithionate method for processing oxidized Pb-Zn ores were also described in some papers.

3. **Uranium ore** Chemical treatment has been one of the important methods for treating uranium ores for a long time. But in recent years new progress has been made in this field. For example, a new method of chemical treatment of uranium-and complex sulphides-containing carbonatites can recover U, Cu, Pb, Zn and other values.

4. **Impurities removal from concentrates** Chemical process for treating W, Sn and some rare metals rough concentrates to obtain products up to standard has long since been used in production. In some papers at the meeting were outlined some special methods of chemical treatment, such as reducing staining process for iron removal to upgrade Cr-concentrate, biological leaching high arsenic sulphide concentrate for arsenic removal, metallizing roasting process for treating refractory oolitic hematite ores, chemical process to treat P-containing manganese ore, etc.

5. **Treatment of slag, dust, anode slime, effluent, rock and tailings** Combined flowsheets of beneficiation and metallurgical process to treat wastes, such as slags of smelters and tailings from concentrators, have already been in commercial use in China. The examples include flotation of copper smelting slags to recover copper, beneficiation of artificial rutile, flotation of leached zinc residue to recover silver, flotation of anode slime, bacterial leaching of tailings to recover uranium and copper, etc. Progress has also been made in the combined technology to treat copper dust leaching residue, Mn- and Nb-containing slags, high calcareous coal ashes containing V, Mo and U, mine effluents and other waste materials.

At the symposium it was realized that our task in future is to develop the new technology of chemical mineral processing in accordance with the features of mineral resources in China and the requirements of their full utilization and environmental protection, and to put the more established processes into production as soon as possible.

However, it should be noted that most papers discussed at the meeting mainly involved laboratory testing results. Therefore, there must be every effort to bring them into production to achieve technically feasible and economically reasonable performance. That is the grave responsibility we should take upon ourselves.

APPLIED SCIENCES

BRIEFS

TIANJIN COMPUTERS--The North China Branch of the National Consumers' Association of (DCF)-100 computers was inaugurated in Tianjin 13 November under the auspices of the State Bureau of Computers and the Chinese Computer Service Company. Attending the ceremony were representatives of consumers, manufacturers, scientific institutes and universities in Hebei, Shanxi, Nei Monggol and Tianjin--totaling 100 persons. Model (DCF)-100 computers are small digital computers which are inexpensive, highly efficient, stable and reliable. They have many uses. [SK170600 Tianjin City Service in Mandarin 1430 GMT 14 Nov 81 SK]

MACHINE TOOL NOISE LEVEL--After a year of tests and making improvements, the laboratory of the research institute of the Kunming Machine Tool Plant has reduced the noise level of the T-68 machine tool from 83 to 79 decibels, making a leap onto the country's advanced level. Noise is an important indicator for judging the quality of a machine tool. Beginning last year, this laboratory in cooperation with the Kunming Institute of Engineering proceeded in manufacturing its own noise [measuring] machine, repeatedly studied the cause of noise produced by the T-68 machine tool, searched for methods of eliminating the noise, and collected large quantities of data. They also adopted measures to improve the processing techniques and cutting tools and succeeded in reducing the noise level. As a result of these measures taken, the quality of this reliable product has been further improved. This article was excerpted from JICHUANG GONGREN [MACHINE TOOL WORKER]. [Text] [Yunnan RUNNAN RIBAO in Chinese 20 Oct 81 p 1]

CSO: 4008/28

Architecture

AUTHOR: None

ORG: Judging Committee

TITLE: "Nationwide Competition of Rural Dwelling Design"

SOURCE: Beijing JIANZHU XUEBAO [ARCHITECTURAL JOURNAL] in Chinese No 10, 20 Oct 81
p 1

TEXT OF ENGLISH ABSTRACT: A nationwide competition of rural dwelling design was jointly sponsored by the Office of Rural Building Development, the State Commission of Capital Construction and CAS in 1980-81. Throughout China 6500 designs were made, of which 142 were recommended by relevant authorities for competition. A meeting for judging these designs was held in Beijing in June 1981. Two designs from Sichuan and Tianjin respectively were awarded first prizes. Thirty designs won second prizes and there were 52 third prizes.

In many of the designs submitted, considerations were given to the use of land, the disposition of the courtyard and the arrangement of the building plan in order to facilitate rural life and sideline production. Local conditions regarding building materials and construction methods were noted. Local architectural styles, new sources of energy, such as marsh gas and sunlight, were considered in some of the winning designs.

AUTHOR: None

ORG: None

TITLE: "Seminar on 'The Changing Rural Habitat' to be Held in Beijing"

SOURCE: Beijing JIANZHU XUEBAO [ARCHITECTURAL JOURNAL] in Chinese No 10, 20 Oct 81
p 33

TEXT OF ENGLISH ABSTRACT: A seminar on "The Changing Rural Habitat" will be held in Beijing, 19-22 October, under the sponsorship of the Steering Committee of the Aga Khan Award for Architecture at the invitation of CAS. Among the 20 Chinese and 50 foreign scholars and specialists who will attend the seminar there will be architects, city planners, as well as artists, economists, historians and geologists. Mr and Mrs Aga Khan will be present at the seminar. An eight day visit to Xian and Xinjiang will be made after the meeting. Mr Aga Khan, Mrs Han Suyin and leaders of relevant Chinese institutions will speak at the seminar. In all, 12 papers, including three from China entitled "Rural Dwellings," "Utilization of Marsh Gas" and "Cave Dwellings," will be read. Pictures showing Chinese architecture will be exhibited.

AUTHOR: ZHOU Peinan [0719 1014 0589]
etc.

ORG: None

TITLE: "New Spaces Gained from Loess-land"

SOURCE: Beijing JIANZHU XUEBAO [ARCHITECTURAL JOURNAL] in Chinese No 10, 20 Oct 81
pp 34-40

TEXT OF ENGLISH ABSTRACT: With a long history in traditional building, the cave dwelling still plays an important role in present-day housing and tourism. The authors point out the following advantages of cave dwellings: 1. Overall consideration to dwelling and cultivation in land-use leads to the gain of more space. 2. Warm in winter and cool in summer, easily constructed and low in cost. 3. Incorporation of natural and man-made environments. Cave dwelling is an effective means of building in loess-lands and still has its vitality in serving present-day life under certain conditions by inheriting traditional experiences and making improvements and renovations.

Experiments have been conducted in Xingyang County, Henan Province, in regard to hillside cave dwellings with courtyards, which show the following characteristics: 1. More spacious both outdoors and indoors. Full utilization of earth and less cut-work by providing earthen stoves in the kitchens and earthen beds and tables

[Continuation of JIANZHU XUEBAO No 10, 20 Oct 81 pp 34-40]

in the living rooms. 2. Dwellings are built on the hillsides and face the water, providing a good environment. 3. All the rooms face the courtyard which offers a center for daily activities with separate quarters for fowls, pigs and latrines. Improvements have been made in lighting and ventilation by making both ends of the caves open.

AUTHOR: ZHANG Jinqiu [1728 6930 4428]

ORG: None

TITLE: "Mosque at Hua Jue Xiang, Xian"

SOURCE: Beijing JIANZHU XUEBAO [ARCHITECTURAL JOURNAL] in Chinese No 10, 20 Oct 81
pp 70-77

TEXT OF ENGLISH ABSTRACT: The erection of mosques in China started in the Tang Dynasty following the introduction of Mohammedanism. After the absorption and blending by Chinese artisans through the ages, mosques in China reached a mature architectural style in the Ming and Qing Dynasties, with distinctive Chinese characteristics. Generally Chinese mosques fall into two categories: those in the Xinjiang Uyghur Region and those in other provinces. The former style was much influenced by central Asiatic architecture, e.g., the Mosque at Kashi, and the latter keeps more traditional Chinese architectural features. The Mosque at Hua Jue Xiang, Xian, is the largest and best preserved example of the latter type. This mosque was first built in the 14th century, and was renovated in 1522, 1606 and 1974. The author analyzes the building with respect to plot plan, architectural style, courtyard disposition and decorative treatment. It has been found that the building satisfies all the requirements of the religious activities, on the one hand, and bears distinctive Chinese architectural features and characteristics on the other.

9717

CSO: 4009/125

AUTHOR: CAO Fengqi [7559 7685 1477]

ORG: Northeastern Normal University

TITLE: "Classification, Regionalization and Periodization of the Peat Deposits in Hebei Province"

SOURCE: Beijing MEITAN XUEBAO [JOURNAL OF CHINA COAL SOCIETY] in Chinese No 3, 1981 pp 34-43

TEXT OF ENGLISH ABSTRACT: The classification, regionalization and periodization of the peat deposits are described, taking the peat deposits in Hebei Province as an example. The classification of the peat deposits is based on the geomorphological types of peat occurrence, so as to make use of the geomorphological marks for mineral exploration. A classification system, including class, subclass, type and sub-type, is proposed. The peat deposits in Hebei Province are divided into four classes. The division of the regions is based on the leading peat-genetic types and the division of their occurrence by taking into consideration the geomorphological types and the dividing boundaries of the geomorphological region. The peat deposits may be classed into regions and sub-regions. The peat deposits in Hebei Province have been divided into five regions. Since the Late Upper Pleistocene period, the formation of the peat deposits in Hebei Province has been, on the whole, related to the fluctuation of the world's climate. They are divided into two periods, and subdivided into several sub-periods according to the difference in the formation of the peat deposits in different regions.

AUTHOR: JIANG Ben [1203 2609]
YANG Guixian [2799 2710 0103]
LIU Mingzhi [0491 2494 2535]

ORG: JIANG and YANG both of the Research Institute of Geology, Central Coal Mining Res arch Institute; LIU of Heshan Coal Mine Administration

TITLE: "Application of Physical Modeling in the Calculation of Hydrology in Coal Mines"

SOURCE: Beijing MEITAN XUEBAO [JOURNAL OF CHINA COAL SOCIETY] in Chinese No 3, 1981 pp 60-70

TEXT OF ENGLISH ABSTRACT: Coal deposits with water rushing from the floor through karst or fissures are widely distributed in China. The method for prediction of water inflows from the roadways of such kind of deposits by a physical model, mainly by mesh analogue, has been investigated. It mainly includes the setting up of the hydrological model for calculating the infiltration field and formulas for relevant parameters, the method for simulating the spatial laminar and turbulent flows of the water rushing point at the nodal of the plate mesh and simulating method for heterogeneity. Finally, the specific procedure and successful results of this modeling method are described with some examples.

AUTHOR: C.K. KWONG

REN Fangbin [0117 5364 2430]

ZHENG Yijia [6774 1837 0857]

QIU Yuhai [6726 5148 3189]

LI Guohua [2621 0948 5478]

et al.

ORG: KWONG of the School of Electrical Engineering, Sydney University; REN, ZHENG and QIU, et al., all of the Beijing Astronomical Observatory, Chinese Academy of Sciences; LI of the Institute of Electronics, Chinese Academy of Sciences

TITLE: "Real Time Data Collection System and Two-dimensional Fourier Transform Hardware for Mi-Yun Meter-wave Aperture Synthesis Radiotelescope"

SOURCE: Beijing DIANZIXUE TONGXIN [JOURNAL OF ELECTRONICS] in Chinese No 4, 1981 pp 201-212

TEXT OF ENGLISH ABSTRACT: In this paper, two pieces of equipment for Mi-Yun meter-wave aperture synthesis radiotelescope are described. These two pieces of equipment are used for data acquisition and handling with the on-line computer, NOVA-3/D.

The Mi-Yun aperture synthesis system consists of an E-W array, giving 192 simultaneous signal pairs of the form $R=W \cos \theta$, $I=W \sin \theta$ per 10 seconds, where W is

[Continuation of DIANZIXUE TONGXIN No 4, 1981 pp 201-212]

the fringe amplitude and $\theta = (2\pi d/\lambda) \cos \delta \sin HA$, the phase (d --the interferometer spacing, λ --the wave length, δ --the declination and HA --the hour angle of field center).

The first equipment is the data collection system which performs the following functions.

1. In every 10 msec it generates a value, $\varphi_0 = A \sin HA$, where A is the carefully chosen constant and HA is the hour angle of the field center.
2. In the same 10 msec it generates φ_k , where $\varphi_k = k\varphi_0$ ($k = 3, 4, \dots, 194$), accurate to 2° .
3. It converts each of the 192 signal pairs into parameters W_k and θ_k ; performs the "fringe stopping" by subtracting φ_k from each θ_k , giving a new signal set of the form $W_k \cos(\theta_k - \varphi_k)$ and $W_k \sin(\theta_k - \varphi_k)$; accumulates for 10 seconds and sends the output data to the on-line computer.

The function $\varphi_0(t) = A \sin HA$ is generated by the digital differential analyzer (DDA) developed by one of the authors (C.K. Kwong).

AM-2901 has been used for the CPU of our system. A block diagram of the whole system is shown in the article, as is the flowchart of the microprogram. The system can work either with mean time or sidereal time.

[Continuation of DIANZIXUE TONGXIN No 4, 1981 pp 201-212]

The other equipment is the two-dimensional direct Fourier transform (DFT) hardware based on the previous work of R.H. Frater, adapted for the data handling of the Mi-Yun system.

The observation will be carried out in 12 hours, filling up 2160 equally spaced hour angles with 192 spacings each, thus 2160 x 192 grid values in the $u-v$ plane (as defined in the article). The Fourier transform of this $u-v$ distribution is to be performed by the DFT hardware to give a radio sky map on a 256 x 256 grid. The performance can be completed in less than six minutes.

In the construction, the principle and scheme developed by Frater has been used with some minor modifications, such as using the hardware multiplier (MPY-12 AJ) in place of the Log. table, increasing the accuracy with interpolations, etc. A block diagram of the DFT hardware is given. As a laboratory test, a set of signals simulating a point source located at the field center was sent to the DFT hardware. The result of the Fourier transform is shown, and agrees well with the estimate.

The two pieces of equipment have now been completed and have worked normally for several months.

AUTHOR: JIN Shengjing [6855 5110 4842]
SHEN Guoguang [3088 0948 0342]
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et al.

ORG: All of Changchun Institute of Physics, Chinese Academy of Sciences

TITLE: "A High-speed High-accuracy A/D Converter"

SOURCE: Beijing DIANZIXUE TONGXIN [JOURNAL OF ELECTRONICS] in Chinese No 4, 1981 pp 213-221

TEXT OF ENGLISH ABSTRACT: A high-speed high-accuracy partially-cascaded A/D converter is developed which is used with the telescope for observing the solar magnetic field. The major techniques employed for realizing high speed and high accuracy are discussed, and some related factors are also considered.

For this converter, the word length is 12 bits, the resolution power is 1 mV, the relative accuracy is less than 0.025 percent, and the rate is $100,000 \text{ sec}^{-1}$ when a sampling hold circuit is cascaded in front of it.

AUTHOR: ZHOU Wenbiao [0719 2429 5903]
SONG Peide [1345 1014 1795]
SONG Wenmiao [1345 2429 8693]

ORG: All of the Institute of Electronics, Chinese Academy of Sciences

TITLE: "The Theory and Calculation of Velocity Resynchronism of Helix Type TWT"

SOURCE: Beijing DIANZIXUE TONGXIN [JOURNAL OF ELECTRONICS] in Chinese No 4, 1981
pp 222-226

TEXT OF ENGLISH ABSTRACT: In the first part, the working equations of velocity tapered TWT are deduced theoretically. This paper presents a computer program for TWT with double velocity jump and describes the calculated results and compares them with experimental data. The comparison shows that they are rather close. Therefore, this program can be used for the design and selection of the TWT with the double velocity jump.

AUTHOR: HE Qichao [0149 0366 6389]
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ORG: Both of the Radio Electronics Department, Sichuan University

TITLE: "A New Method--The Monte Carlo Numerical Integration Method for Computing Collection-efficiency of an Electron Optical System"

SOURCE: Beijing DIANZIXUE TONGXIN [JOURNAL OF ELECTRONICS] in Chinese No 4, 1981
pp 227-236

TEXT OF ENGLISH ABSTRACT: A new method that combines the Monte Carlo method with the numerical integration method used for computing electron trajectories in a vacuum to calculate the electron collection efficiency of the anode (or dynode) of an electron optical system is presented. This method can simulate the whole process of electron motion in a system. Taking the microchannel plate photomultiplier as an example, the collection efficiency is calculated, the influences of the distributions of electron emitting angles and energies are studied, and the limitation and extension of this method are discussed.

AUTHOR: GAO Mingtai [7559 6900 0669]
ZHAO Liping [6392 4539 1627]

ORG: Both of the Institute of Electronics, Chinese Academy of Sciences

TITLE: "The Calculation of Heat Transfer of the Cathode Assembly in a Vidicon and the Design of Cathode Assembly with Small Power Dissipation"

SOURCE: Beijing DIANZIXUE TONGXIN [JOURNAL OF ELECTRONICS] in Chinese No 4, 1981 pp 237-248

TEXT OF ENGLISH ABSTRACT: In this paper a model for calculation of heat transfer of the cathode assembly in vidicon is given. Five cathode assemblies with different constructions have been calculated by the computer. The calculated results prove the model is reasonable. In this paper, there are the following calculations: the temperatures at each part of the assembly; the heat radiation and conduction between different parts; the total power dissipation of the assembly and the influences of changing physical or geometrical parameters of the parts of the assembly on the total power dissipation. This paper is helpful in designing a new cathode assembly.

The design and experiment of the new cathode (Ba-Ni) assembly with small power dissipation are successful. The advantages of the new assembly are firm construction, easy assembly and quick heating (arriving at the operation temperature in a few seconds).

AUTHOR: GUO Hezhong [6753 0735 1807]
CHEN Zenggui [7115 1073 0964]

ORG: Both of the Institute of Electronics, Chinese Academy of Sciences

TITLE: "The Phase Condition of the Weibel Instability Gain Mechanism and a Wide Band Slow Wave Cyclotron Amplifier"

SOURCE: Beijing DIANZIXUE TONGXIN [JOURNAL OF ELECTRONICS] in Chinese No 4, 1981 pp 249-253

TEXT OF ENGLISH ABSTRACT: Starting from the viewpoint of the coherent cyclotron radiation, we work out the phase condition of the Weibel instability gain mechanism and make a comparison with the phase condition of the cyclotron maser gain mechanism. In addition, we propose a conceived slow wave cyclotron amplifier (SWCA) with a periodic rf structure.

AUTHOR: MAO Zhongliang [5403 0022 5328]
REN Qunli [0117 5028 0500]

ORG: MAO of the Suzhou Railway Normal College; REN of the Yangzhou Post and Telegraph Office

TITLE: "Design Principles of 10,000 Chinese Character Radio Teletypewriter"

SOURCE: Beijing DIANZIXUE TONGXIN [JOURNAL OF ELECTRONICS] in Chinese No 4, 1981 pp 254-258

TEXT OF ENGLISH ABSTRACT: This article deals with the design of a 10,000 Chinese character radio teletypewriter based on Zhi's "Chinese character coding method." The teletypewriter consists of a receiver and a transmitter. The former is more important and it contains: (1) 10,000 Chinese characters' geometric distribution structure; (2) 10,000 Chinese characters' optional selection and typewriting method; (3) 5050-0000 code; (4) electronic calculation; (5) electronic calculation clock procedure; (6) 5050 code calculation circuit connection; (7) production of 0000-5050 code.

This teletypewriter adopts the direct character memory method, so no large-scale high density memory elements are required.

This teletypewriter not only can directly transmit Chinese characters, but also can

[Continuation of DIANZIXUE TONGXIN No 4, 1981 pp 254-258]

be connected to the national computer network to communicate with data centers. The data required can be typewritten in Chinese at the very moment they are received.

9717
CSO: 4009/114

Engineering

AUTHOR: ZHANG Xiaoliang [1728 2400 5328]
MU Jinhu [4476 6855 5706]

ORG: Both of Taiyuan Institute of Technology

TITLE: "The Calculating Method for Prestressing Losses Caused by the Shrinkage and Creep of Prestressed Lightweight Concrete"

SOURCE: Taiyuan TAIYUAN GONGXUEYUAN XUEBAO [JOURNAL OF TAIYUAN INSTITUTE OF TECHNOLOGY] in Chinese No 3, 1981 pp 1-11

TEXT OF ENGLISH ABSTRACT: A calculating method for prestressing losses caused by the shrinkage and creep of prestressed lightweight concrete is presented in this paper, along with the relative coefficients of effective calculating values. Tables containing recommended values for design are also given herein. The results of this study have been accepted in drafting the "Temporary Codes for the Design of Prestressed Lightweight Concrete Structures" of China.

AUTHOR: YANG Guitong [2799 2710 6639]
DING Shuren [0002 2885 0086]

ORG: Both of Taiyuan Institute of Technology

TITLE: "A Linearized Constitutive Equation of Rate Sensitive Materials under High Strain Rate Conditions and Its Application"

SOURCE: Taiyuan TAIYUAN GONGXUEYUAN XUEBAO [JOURNAL OF TAIYUAN INSTITUTE OF TECHNOLOGY] in Chinese No 3, 1981 pp 12-20

TEXT OF ENGLISH ABSTRACT: In this paper, we investigate a linearized constitutive equation of rate sensitive materials under high strain rate conditions. Our analysis is based on the experimental results of Clark and Duwez (1950) and others. The new linearized constitutive equation is easier to use in engineering practice. A simple example is given at the end of the paper.

AUTHOR: XU Xia [1776 0204]
CHEN Guinan [7115 2710 2809]

ORG: XU of Taiyuan Institute of Technology; CHEN of Taiyuan Lathe Works No 1

TITLE: "The Development of Short Gear Chain Transmission Headstock of CT6140"

SOURCE: Taiyuan TAIYUAN GONGXUEYUAN XUEBAO [JOURNAL OF TAIYUAN INSTITUTE OF TECHNOLOGY] in Chinese No 3, 1981 pp 21-30

TEXT OF ENGLISH ABSTRACT: CT6140 has been designed and produced based on an analysis of 214 kinds of foreign and Chinese lathes, and meets the "Chinese Regulations for All Types and Sizes of Lathes." The main characteristics of the headstock are: short gear-chain transmission, low noise, high efficiency and high vibration strength.

Through a series of tests by the Shaxi Machinery Department, the Shenyang Lathe Research Institute and over 30 other lathe units and factories, CT6410 has been accepted as well-qualified, with the noise of the headstock being 78 dB (A), cutting slot length 210 mm, idling power 1.62 kw (with change gears but no feed), and cutting moment being 25 percent greater than the standard one, steady with no vibration.

AUTHOR: WANG Keming [3769 0344 2494]

ORG: Taiyuan Institute of Technology

TITLE: "Research on the Ignition System of the Double Cam Distributor in a Rotor Engine"

SOURCE: Taiyuan TAIYUAN GONGXUEYUAN XUEBAO [JOURNAL OF TAIYUAN INSTITUTE OF TECHNOLOGY] in Chinese No 3, 1981 pp 31-38

TEXT OF ENGLISH ABSTRACT: This article introduces the ignition system of the double cam distributor used in the middle-sized rotor engine. In the article the circuit arrangement of the ignition system as well as structures of the double cam distributor and specially-made ignition coil with two ends, and the theoretical ground for the series ignition are briefly described and are compared with the usual ignition systems in China and abroad.

AUTHOR: GUAN Yuxiang [7070 3768 4382]
ZHANG Rongrui [1728 2837 3843]

ORG: Both of Taiyuan Institute of Technology

TITLE: "The Matrix Calculating Method of the Spatial Mechanism Position and Its Errors"

SOURCE: Taiyuan TAIYUAN GONGXUEYUAN XUEBAO [JOURNAL OF TAIYUAN INSTITUTE OF TECHNOLOGY] in Chinese No 3, 1981 pp 39-52

TEXT OF ENGLISH ABSTRACT: Based on reference material, this paper introduces the fundamental equation for determining the errors of spatial mechanisms in geometric parameters (lengths, rotation angles, etc.) by using the matrix differentiation method combined with the practical application of robot manipulators to calculate the position of the spatial mechanism and its errors.

AUTHOR: LIANG Zhilin [2733 1807 7207]
SHE Xiaodong [0152 2556 2639]

ORG: LIANG of the Department of Mechanical Engineering, Taiyuan Institute of Technology; SHE of the Taihang Meter Factory

TITLE: "Research on the Pit Skin Defect of Aluminum Alloy Investment Castings"

SOURCE: Taiyuan TAIYUAN GONGXUEYUAN XUEBAO [JOURNAL OF TAIYUAN INSTITUTE OF TECHNOLOGY] in Chinese No 3, 1981 pp 53-60

TEXT OF ENGLISH ABSTRACT: Based on productive practice, in this paper the pit skin defect of aluminum alloy investment castings is investigated, various factors affecting the defect are examined, and defect formation mechanism is fairly deeply explored. In addition, some technical steps for eliminating the defect are presented.

AUTHOR: ZHANG Hongmin [1728 1347 3046]
YANG Yuyong [2799 5148 0516]
SUN Jue [1327 3778]
YANG Lijiu [2799 4409 3061]

ORG: ZHANG, YANG Yuyong and SUN all of the Taiyuan Institute of Technology;
YANG Lijiu of the Shanghai Lathe Institute

TITLE: "The Finite Element Calculation of the Spoke-like Transducer"

SOURCE: Taiyuan TAIYUAN GONGXUEYUAN XUEBAO [JOURNAL OF TAIYUAN INSTITUTE OF TECHNOLOGY] in Chinese No 3, 1981 pp 61-71

TEXT OF ENGLISH ABSTRACT: The application of the new spoke-like transducer has been widely adopted recently, having the advantages of low height, broad measuring range, high accuracy, good linearity, etc. In order to determine its dimensions properly and reasonably and to provide a dependable basis of design, the stress and vertical displacement of the spoke of the transducer are calculated and analyzed with a three-dimensional finite element method. An attempt is made to treat this problem as a two-dimensional one. Several two-dimensional models are considered and the results thus obtained are compared with those of the three-dimensional model.

AUTHOR: WANG Jinbao [3769 6651 1405]

ORG: Taiyuan Institute of Technology

TITLE: "Law of Groundwater Storage in Loess Soil Distribution Area"

SOURCE: Taiyuan TAIYUAN GONGXUEYUAN XUEBAO [JOURNAL OF TAIYUAN INSTITUTE OF TECHNOLOGY] in Chinese No 3, 1981 pp 72-86

TEXT OF ENGLISH ABSTRACT: The loess soil distribution area is composed of "two-element structure" in which the overlying stratum is loess soil, and the underlying one is Quaternary Low-Pleistocene and antediluvial stratum. The former is heterogeneous containing crack-interstitial water aquifuge, and the latter can be composed of good water-bearing structure under certain conditions.

According to the point of view of geomechanics, the law of the occurrence and distribution of the loess soil area ground water is subject to the function of water controlling the behavior and of that of rock beds.

This paper discusses the water-controlling characteristics in loess soil distribution area in seven respects. According to the distributed geomorphological and water-bearing features, five types of ground water in loess soil distribution area are classified.

AUTHOR: LIU Xingda [0491 2502 6671]

ORG: Taiyuan Institute of Technology

TITLE: "The Commutatorless Motor with Silicon Controlled Rectifier and Its Field Harmonics and Torque Ripples"

SOURCE: Taiyuan TAIYUAN GONGXUEYUAN XUEBAO [JOURNAL OF TAIYUAN INSTITUTE OF TECHNOLOGY] in Chinese No 3, 1981 pp 87-95

TEXT OF ENGLISH ABSTRACT: Commutatorless motors are referred to as a new kind of electric machine recently developed. In this paper, some different types and constructions of the new electric machines arising in the world are first introduced, and then some additional problems appearing in the synchronous motors supplied with the silicon controlled source are discussed, including those occurring in field harmonics and torque ripples. The characteristics, effects and the methods for overcoming the defects are consequently analyzed.

AUTHOR: MA Zhiyi [7456 1807 3015]

ORG: Taiyuan Institute of Technology

TITLE: "The Effects and Inhibition of Nitrifying Action of BOD Test"

SOURCE: Taiyuan TAIYUAN GONGXUEYUAN XUEBAO [JOURNAL OF TAIYUAN INSTITUTE OF TECHNOLOGY] in Chinese No 3, 1981 pp 96-101

TEXT OF ENGLISH ABSTRACT: In this paper, two steps in the process of biochemical oxygen demand and the effects produced by nitrification are discussed. Then, a detailed introduction to various methods of inhibiting nitrification, including the methods of disinfection and chemical inhibition, is given. Of these, the most effective method is the addition of chemical agents of ammonium chloride and TCMP. The author proposes that the inhibition of nitrification must be considered as a regular step in the BOD test, and that a unified national standard method of analysis must be established as soon as possible.

AUTHOR: ZHAO Xihuan [6392 6007 1403]

ORG: Taiyuan Institute of Technology

TITLE: "A Review of the Development of the SHPB Apparatus"

SOURCE: Taiyuan TAIYUAN GONGXUEYUAN XUEBAO [JOURNAL OF TAIYUAN INSTITUTE OF TECHNOLOGY] in Chinese No 3, 1981 pp 102-113

TEXT OF ENGLISH ABSTRACT: The development of the SHPB apparatus is reviewed in this paper in which the theoretical foundation of the SHPB apparatus and its difficulties in experiments and measurements are discussed.

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CSO: 4009/118

Iron and Steel

AUTHOR: ZHANG Shutang [1728 2885 1016]
LI Xiaoyu [2621 1420 3768]
XIA Dairun [1115 0108 3387]

ORG: All of the Central Iron and Steel Research Institute

TITLE: "Study of Flatness while Rolling Ultra Foils"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 10, 1981 pp 1-5

TEXT OF ENGLISH ABSTRACT: In rolling different kinds of metal and alloy foils of thickness smaller than 0.01 mm with multi-high mill, orange peel-like ripples easily appear on the whole surface of the foil and it becomes very uneven. The influence of principal technological factors, such as front tension, total reduction, quality of foil edge, surface roughness and material of rolls, etc., on the orange peel-like ripples has been studied. At the same time, the form of deformation zone, the elongation along the width of foil, texture and stress, etc., have been measured. It is pointed out that the orange peel-like ripples are caused by inhomogeneous stress spread all over the whole foil surface during deformation. These inhomogeneous stresses originate mainly from the roll with rough surface and anisotropic deformation of grains in foil. Due to the minor ability of the ultra thin foil to resist the bending stress, the orange peel-like ripples easily appear on the surface of foil, even under very little stress. Experiments show that by adopting rational technology, it is possible to eliminate the orange peel-like ripples and obtain even ultra thin foil.

AUTHOR: CHEN Zhentao [7115 2182 7290]
YANG Jie [2799 4634]
LIU Xiaoping [0491 1420 1627]
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ORG: CHEN of the Institute of Iron and Steel Research, AIS Company; YANG of Wuhan Iron and Steel Institute; LIU of Shoudu Iron and Steel Company; HE of the Beijing University of Iron and Steel Technology

TITLE: "Experimental Study of Outer Zones' Effect for Cold Strip Rolling"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 10, 1981 pp 6-10

TEXT OF ENGLISH ABSTRACT: In order to increase the precision of the roll-force models for cold strip-rolling, the outer zones' effect is studied. The results of the tests show that the outer zones have a greater influence when ϵ is smaller and this effect is not obvious when $\epsilon > 10-15$ percent. The influence increases with increasing initial thickness. Therefore, this factor must be considered when calculating roll force under certain conditions. The results of the test are in complete agreement with plastic mechanics.

AUTHOR: WANG Guodong [3769 0948 2767]
ZHANG Shutang [1728 2885 1016]

ORG: Both of the Central Iron and Steel Research Institute

TITLE: "The Strip Shape Equation and Its Application"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 10, 1981 pp 11-17

TEXT OF ENGLISH ABSTRACT: The strip shape equation is one of the fundamental equations which describes the process of tandem cold rolling, but an accurate quantitative expression has not been given to the present time. Based on the elastic deformation analysis of rolls, a quantitative expression of the strip shape equation

$$\alpha + \beta p_c + \gamma p_e + \delta F_w - (h_c - h_e)/2 = 0$$

is deduced in this paper. The physical meaning of the coefficients $\alpha, \beta, \gamma, \delta$ is discussed, and the method of defining them is given. The strip shape equation can be used for analyzing synthetical characteristics of a tandem cold rolling mill, the direct calculation of the optimum roll bending jack force, the estimation of roll crowns and the adoptive correction calculation of the optimum roll bending jack force. As an example of the application, a direct method for calculating the optimum roll bending jack force is given. This method is simpler and more accurate.

AUTHOR: LU Yuqiu [4151 0060 6633]
WANG Xianjin [3769 0341 6651]
YE Yusheng [5509 3768 3932]

ORG: All of Beijing University of Iron and Steel Technology

TITLE: "An Experimental Study on Continuous Tube Rolling Process with a Controlled Mandrel"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 10, 1981 pp 18-23

TEXT OF ENGLISH ABSTRACT: The continuous tube rolling process with a controlled mandrel is a new method of hot rolling of tubes. It has been experimentally studied at the mills' laboratories. It is shown that the mean total pressure on the rolls and the mean specific pressure on the mandrel in the tube rolling process with controlled mandrel are much less than those with a floating mandrel. In the former process the accuracy of tube diameter will increase effectively. The influence of the different distribution of elongation on the accuracy to tube wall thickness has been indicated. The investigation of the technological performance of four kinds of lubricants and the experiment with the mandrel made up of several parts with varied taper have been carried out and some positive results have been obtained. Based on the experimental study, it has been suggested that the adoption of the 3-4 stands tube rolling process with controlled mandrel will transform the small-scale plug mill set.

AUTHOR: YIN Guomao [3009 0948 5399]
WANG Dianhou [3769 3013 0624]
XIA Shanghua [1115 1424 5478]

ORG: All of Chengdu Seamless Steel Tube Factory

TITLE: "Study of a New Technology for Cold Rolled Non-magnetic Stainless Steel Tube with High Strength"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 10, 1981 pp 24-30

TEXT OF ENGLISH ABSTRACT: This paper describes a new technology which strengthens the stainless tube steel 2Cr18Ni11Ti and 1Cr18Ni9Ti by cold deformation and thermal treatment. It shows that the yield strength of both steels exceeds 60 kg/mm² and 50 kg/mm² respectively, the intergranular corrosion resistance is considerably increased, and other properties, such as magnetic conductivity and ductility, are also improved. By adopting the new technology, 50 percent of raw materials and 50 percent of machining time may be saved and, consequently, the cost will be considerably reduced. This new technology is an important way to improve the properties of materials produced and to exploit the potentiality of material utilization.

AUTHOR: HUANG Xinfeng [7806 1800 1496]

ORG: Chongqing Special Steel Works

TITLE: "Production of the Composite Roll with High Ni-Cr-Mo Alloy Chilled Cast Iron Case and Spheroidal Graphite Iron Core"

SOURCE: Beijing GANGTIE [IRON AND STEEL] in Chinese No 10, 1981 pp 31-37

TEXT OF ENGLISH ABSTRACT: This paper surveys a description of the technological features of the washing process which is adopted to eliminate the severe foundry defects of the composite rolls with high Ni-Cr-Mo alloy chilled cast iron case and spheroidal graphite iron core. In practice, the carbon content of the outer layer is limited to a lower percentage, and proper quantity of magnesium is added so as to employ an iron of higher silicon content. The pouring process is also improved, increasing the early solidification layer thickness outside of the roll. In addition, high silicon spheroidal graphite iron is used as the material washing the roll core. By adopting the above process, one can effectively prevent the formation of hot tears, microflaw, gas bubbles in rolls, and the problem of insufficiency of depth of chilled structure is solved thoroughly. The rate of qualified cast is raised to over 91 percent, hardness of roll surface is HS 75-85, and the consumption of the roll is 2-3 kg/t when a 2.5-8 mm thickness steel plate (therein, 2/3 thin plate; 1/3 - 1/2 alloy steel plate) is rolled. Theoretical analysis on the prominent effect achieved is also described in this paper.

AUTHOR: LI Xumo [2621 6070 6206]
ZHANG Jinde [1728 6930 1795]
SU Jinrong [5685 6855 2837]
et al.

ORG: LI, ZHANG and SU all of the Chinese Metrological Sciences Research Institute; et al.

TITLE: "A New Type of High Temperature Platinum Resistance Thermometer"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese No 4,
22 Oct 81 pp 243-252

TEXT OF ENGLISH ABSTRACT: A new type of high temperature platinum resistance thermometer has been developed and tested for use as an interpolation instrument for the International Practical Temperature Scale in the temperature range from 630.74 to 1064.43°C instead of the platinum/10 percent rhodium-platinum thermocouple. We have constructed more than 60 thermometers, which have a nominal resistance of 0.25 ohms at 0°C and have strip-shaped supports with notches. The construction of the thermometer is designed in such a way that the curvature of the platinum wire in a sensor keeps almost constant, and the strain in the wire can be decreased to the smallest amount.

The tests, which lasted for two years, show that the stability of the thermometer

[Continuation of JILIANG XUEBAO No 4, 22 Oct 81 pp 243-252]

is excellent. The average change in resistance of 10 thermometers at 0°C is 1.3 mK for every 100 hours during heating at temperatures from 1070 to 1100°C, and the average change of 5 better thermometers is 0.9 mK. The annealing time at 1100°C for achieving this stability is as short as 150 hours, which is much less than that reported in previous publications. Generally, the change of R_0 after high temperature quenching is no more than 1 mK. The insulation resistance of these thermometers at 1064°C is not less than 27 MΩ.

The problem of fused silica devitrification seems to be solved and very slight devitrification existed on the surface of the thermometer sheath, which had been exposed to the temperature of 1070°C for 952 hours.

AUTHOR: AN Ting

ORG: None

TITLE: "30 MHz Waveguide Beyond Cut-off Attenuator Standard Built in NIM"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese No 4,
22 Oct 81 pp 253-261

TEXT OF ENGLISH ABSTRACT: This paper describes the main characteristics of the 30 MHz WBCO attenuator standard and the calibration system. Error analysis and experiment results show that the accuracy of the WBCO is better than $\pm(5 \times 10^{-5} A + 0.0002)$ dB in the linear section, and the uncertainty of the calibration system is less than $\pm(1-2) \times 10^{-4} A$ in a range of 0-100 dB, where A is the measured attenuation in dB.

AUTHOR: CHEN Xiaju
et al.

ORG: None

TITLE: "The Standard of Visual Diffuse Transmission Density"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese No 4,
22 Oct 81 pp 262-267

TEXT OF ENGLISH ABSTRACT: This paper describes a standard apparatus of visual diffuse transmission density. It consists of a integrating sphere which is illuminated by a source with 3000 K color temperature, and a silicon photodiode with $V(\lambda)$ filters, as well as a digital display system with current-voltage converter. Its reproducibility is $\pm 0.002 D$, and the uncertainty is $\pm 0.005 D$. The comparison between it and the standard density tablet of other countries shows a good agreement for the density values. It shows that, therefore, the same diffuse transmission density value can be obtained with different methods, as long as the geometric and spectral conditions of density conform to the recommendation of the ISO.

AUTHOR: SONG Hongen [1345 7703 1869]

ORG: Beijing Optical Instruments Plant

TITLE: "The Relationship between Mechanical and Electrical Systems of Electronic Balance and Its Engineering Design"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese No 4,
22 Oct 81 pp 268-278

TEXT OF ENGLISH ABSTRACT: In this paper the relationship between mechanical and electrical systems of electronic balance are systematically discussed based on the theory of automatic-control. A simple and practical method for the engineering design of an electronic balance in closed loop is described and an example is given.

AUTHOR: CAI Lijun [5591 4409 0689]

ORG: Beijing Institute of Aeronautics and Astronautics

TITLE: "Analysis on Dynamic Response of the Cutting Dynamometer"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese No 4,
22 Oct 81 pp 279-288

TEXT OF ENGLISH ABSTRACT: Based on the dynamic characteristics, this paper deals with various dynamic error responses and relationships among various parameters in design of a dynamometer, and derives some formulas for the amplitude error and frequency bandwidth, the residual deviation, the optimum damping ratio, etc. In this paper, the theoretical basis and practical calculating methods for the design of the cutting dynamometer are also given.

AUTHOR: JIN Shizeng [6855 0013 1073]
TANG Junwu [0781 0193 2976]

ORG: Both of the Beijing Institute of Iron and Steel Technology

TITLE: "Research on the Stress Field of a Shear Load Cell with Photoelastic Method"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese No 4,
22 Oct 81 pp 289-294

TEXT OF ENGLISH ABSTRACT: This paper describes the experimental research of the stress field on a shear load cell with the photoelastic method. The results obtained are helpful in determining the optimum structure and improving the precision of the load cells.

AUTHOR: ZHAO Yinghai [6392 5391 3189]
WANG Zihe [3769 5261 0735]

ORG: ZHAO of the Hebei Metrology Management Bureau; WANG of the Chinese Metrological Sciences Research Institute

TITLE: "On the Temperature Correction of the Volume of Standard Containers"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese No 4,
22 Oct 81 pp 295-302

TEXT OF ENGLISH ABSTRACT: In the volume-temperature corrections for the standard container, the temperature of the liquid inside the container is usually used as that of the standard container, while the influence of the environmental temperature is neglected. In this paper, an analytic solution of the thermal strain and the temperature distribution is derived from the theory on the thermal stress, the effect of which is taken into consideration. The formulas of the temperature corrections under various conditions are given and their accuracies are evaluated.

AUTHOR: ZHU Dingming

ORG: None

TITLE: "Correction to Bowersox' Step Approach to the Dynamic Calibration of Transducers"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese No 4,
22 Oct 81 pp 303-310

TEXT OF ENGLISH ABSTRACT: Considering the difference between the ideal pressure step signal and a practical one from a real shock tube during the dynamic calibration of the transducers, a correction to the Bowersox step approach for calculating the frequency characteristics from time characteristics is presented in this paper. According to the approximative mathematical model, the correction equations are derived by the δ function. The correction methods and equations can be used for dynamic and quasi-static calibrations of pressure, force and other transducers in transient excited methods of step or ramp function inputs.

AUTHOR: LIU Yuzhao [0491 3768 3564]
BA Enxu [1572 1869 2485]
GUAN Xin'an [7070 0207 1344]
LIU Zhiguo [0491 1807 0948]

ORG: All of Nankai University

TITLE: "Frequency Stabilized by the Dip Due to Competition of Magnetic Polarization Modes"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese No 4,
22 Oct 81 pp 311-315

TEXT OF ENGLISH ABSTRACT: This paper gives the principle of frequency stabilized by means of the dip due to competition of magnetic polarization modes. The experiment shows that the ratio of the dip depth of the magnetic polarization mode competition to the corresponding output can approach 1:1. A good frequency stability is still obtained even if the detecting decreases to 0.02 volts.

AUTHOR: HU Yanrui

ORG: None

TITLE: "Characteristics of the Combination-type Standard Cells"

SOURCE: Beijing JILIANG XUEBAO [ACTA METROLOGICA SINICA] in Chinese No 4,
22 Oct 81 pp 316-320

TEXT OF ENGLISH ABSTRACT: Through the precise measurements for the combination-type standard cells made by two manufacturers, the EMF-temperature relations of (P+P-C), (S+P-C) and (B+B+S+S+S+SP) cells in a temperature range of 0-40°C and of (S+B) and (S+S+S+SP+SP) cells in a range of 15-40°C have been discovered. Temperature ranges of maximum EMF value of some cells are also found. There hysteric effect, annual change, EMF reproducibility after temperature cycles and inner resistance have been studied. It is also found that the characteristics of the combination-type cells depend on the characteristics of each composite cell. The best one is the (P+P-C) cell, and its annual change is the smallest. However, the characteristics of the combination-type standard cells with the bismuth cell are the worst.

9717

CSO: 4009/111

AUTHOR: ZHUANG Dawei [5445 1129 5588]

ORG: Department of Mathematics, Beijing University

TITLE: "On Solving a Class of Nonlinear Evolution Equations"

SOURCE: Beijing BEIJINGDAXUE XUEBAO ZIRAN KEXUEBAN [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 3, 1981 pp 1-18

TEXT OF ENGLISH ABSTRACT: In a previous article we obtained a class of nonlinear evolution equations associated with the eigenvalue problem

$$\varphi_1 = R\varphi, \quad R = \begin{pmatrix} -i\xi^j & \xi q \\ \xi r & i\xi \end{pmatrix}, \quad \varphi = \begin{pmatrix} \varphi_1 \\ \varphi_2 \end{pmatrix},$$

i.e.,

$$\begin{pmatrix} q_1 \\ r_1 \end{pmatrix} = D \left(\sum_{j=1}^{n-1} a_{j1}(t) L^{n-j-1} \right) \begin{pmatrix} q \\ r \end{pmatrix},$$

[Continuation of BEIJINGDAXUE XUEBAO ZIRAN DEXUEBAN No 3, 1981 pp 1-18]

where

$$L = \begin{pmatrix} -\frac{D}{2i} + \frac{1}{2} q D^{-1} r D & \frac{1}{2} q D^{-1} q D \\ \frac{1}{2} r D^{-1} r D & \frac{D}{2i} + \frac{1}{2} r D^{-1} q D \end{pmatrix}, \quad D = \frac{\partial}{\partial x}, \quad D D^{-1} = D D^{-1} = 1,$$

In this paper we point out that these equations can be solved by inverse scattering transformation method when q, r are not compact.

AUTHOR: WEN Guochun [5113 0948 2797]
DAI Zhongwei [2071 0022 4850]

ORG: Both of the Department of Mathematics

TITLE: "The Oblique Derivative Boundary Value Problem for Elliptic Complex Equation of First Order in a Multiply-connected Domain"

SOURCE: Beijing BEIJINGDAXUE XUEBAO ZIRAN KEXUEBAN [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 3, 1981 pp 19-29

TEXT OF ENGLISH ABSTRACT: In this paper we discuss the oblique derivative boundary value problem in an $N+1$ -connected domain G for the nonlinear uniformly elliptic complex equation of first order in the plane:

(1) $W_z = F(z, W, W_z)$, $F(z, W, W_z) = Q_1(z, W, W_z)W_z + Q_2(z, W, W_z)\bar{W}_z + A_1(z, W)W + A_2(z, W)\bar{W} + A_3(z, W)$. For the sake of convenience, let G be a circular domain in the unit disc $|z| < 1$ which is bounded by $N+1$ circles Γ_j : $|z - z_j| = r_j$ ($j = 0, 1, \dots, N$), and Γ_0 : $|z| = 1$, $z = 0 \in G$.

Suppose that Equation (1) satisfied condition C:

1) Function $F(z, W, U)$ is continuous for $z \in \bar{G}$, $W \in E$ (the whole plane), $U \in E$ and possesses the generalized derivative of first order for $z \in G$, $W \in E$, $U \in E$, and $F_W, F_{\bar{W}}, F_z$ satisfy inequalities:

[Continuation of BEIJINGDAXUE XUEBAO ZIRAN KEXUEBAN No 3, 1981 pp 19-29]

$$(2) \|F_W\|_{L_p(\bar{G})} \leq K_0, \|F_{\bar{W}}\|_{L_p(\bar{G})} \leq \epsilon K_0, \|F_z\|_{L_p(\bar{G})} \leq K_0,$$

$$(3) |F(z_1, W_1, U_1) - F(z_2, W_2, U_2)| \leq K_0 |z_1 - z_2|^\alpha + \epsilon K_0 |W_1 - W_2|^\alpha + q_0 |U_1 - U_2|, \\ |F[1, W(1), W_z(1)]| \leq K_0,$$

where $p (> 2)$, α ($0 < \alpha < 1$), K_0 ($0 < K_0 < \infty$), ϵ ($0 < \epsilon \leq 1$), q_0 ($0 \leq q_0 < 1$) are all constants.

2) Equation (1) satisfies the uniformly elliptic condition, i.e.,

$$(4) |F_U| + |F_{\bar{U}}| \leq q_0 < 1,$$

for almost every point of $z \in G$, where q_0 is a constant.

Problem P Find the continuously differentiable solution $W(z)$ for Equation (1) in \bar{G} such that it satisfies the oblique derivative boundary condition:

$$(5) \operatorname{Re}[\lambda(z)W_z + s(z)W(z)] = r(z), z \in \Gamma, W(1) = 0,$$

where

$$|\lambda(z)| = 1, C_V[\lambda(z), \Gamma] \leq l_1, C_V[s(z), \Gamma] \leq \epsilon l_1, C_V[r(z), \Gamma] \leq l_2,$$

in which

$$\nu(\frac{1}{2} < \nu \leq 1), l_1, (0 < l_1 < \infty)$$

are two constants.

When $K = \frac{1}{2\pi} \Delta_r \arg \lambda(z) \geq N$ conditions.

, we also assume that W_z satisfies $2K - N + 1$

Problem P of Equation (1) in the unit disc G was considered by I.I. Daniliuk and Fang Ainong.

In this paper we establish the equivalence theorem, give the expression and estimate for the solutions of Problem P and then use the Schauder fixed-point theorem to prove the solvability for Problem P of Equation (1) in the $N+1$ -connected domain.

Theorem Let the nonlinear equation (1) of first order satisfy the condition C, and if ϵ in (2), (3) is sufficiently small, then

- 1) When $K \geq N$, Problem P of Equation (1) has $2N$ solvable conditions;
- 2) When $K \leq 0$, Problem P has $3N-2K-1$ solvable conditions;
- 3) When $0 < K < N$, the total number of solvable conditions for Problem P is not greater than $3N-K$.

In addition, by using Fredholm's theorem of integral equations, we also discuss the solvability of the oblique derivative boundary value problem for linear uniformly elliptic complex equations in the $N+1$ -connected domain.

AUTHOR: CHEN Jiading [7115 1367 7844]

ORG: Department of Mathematics

TITLE: "On the Minimax Method for the Truncated Life Test with Fixed Time"

SOURCE: Beijing BEIJING DAXUE XUEBAO ZIRAN KEXUEBAN [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 3, 1981 pp 30-39

TEXT OF ENGLISH ABSTRACT: Let $F(x)$ be a life distribution with density function $f(x)$ ($F(0)=0$), and T be a fixed positive number ($0 < T \leq \infty$). Suppose that $F(t) < 1$ for all $t \in [0, T)$, and the failure rate function $r(t) \triangleq \frac{f(t)}{1-F(t)}$ is increasing on $[0, T)$. Then a life test of (n, T) type is defined as follows: We select n specimens randomly from a population with distribution $F(x)$, and begin the testing for n specimens at the same time. The stopping time of the test is $\min(X_1^{(n)}, \dots, X_n^{(n)})$, $X_1^{(n)}, \dots, X_n^{(n)}$ are the lives of n specimens respectively. Thus we can get data $X_1^{(n)}, \dots, X_n^{(n)}$ from the test, where $X_1^{(n)}, \dots, X_n^{(n)}$ are order statistics ($X_0^{(n)} \triangleq 0$) and τ_n is defined as

$$\tau_n = \begin{cases} \max\{i: 1 \leq i \leq n, X_i^{(n)} < T\}, & \text{if } X_n^{(n)} < T, \\ 0, & \text{if } X_n^{(n)} \geq T. \end{cases}$$

[Continuation of BEIJINGDAXUE XUEBAO ZIRAN KEXUEBAN No 3, 1981 pp 30-39]

The estimate $\hat{r}_n(t)$ for $r(t)$ based on a so-called minimax method is the following:

If $X_{(n)} \geq T$, set $\hat{r}_n(t) \equiv 0$,

If $X_{(n)} < T$, set $\hat{r}_n(t) = r_n(Z_i)$ ($t \in [Z_i, Z_{i+1})$) ($i = 0, 1, 2, \dots, d$), where Z_0, Z_1, \dots, Z_d ($Z_0 = 0 < Z_1 < \dots < Z_d = T$) are the different numbers among $X_{(n)}, \dots, X_{(n)}$, and

$$r_n(Z_i) = \min_{u \in [Z_i, Z_{i+1})} \max_{v \in [Z_i, Z_{i+1})} \left\{ \frac{v - u}{S_n(Z_i, Z_i)} \right\}$$

$$S_n(Z_i, Z_i) = \sum_{j=1}^i (Z_j - Z_{j-1}) + (n - v)(Z_i - Z_{j-1}).$$

The estimate $\hat{R}_n(t)$ for the reliability $R(t) \triangleq 1 - F(t)$ can be represented as

$$\hat{R}_n(t) = \exp \left\{ - \int_0^t r_n(x) dx \right\}$$

In the present paper, the following main theorem is proved:

Let X_1, X_2, \dots be mutually independent random variables on a complete probability space (Ω, \mathcal{F}, P) which have a common distribution function $F(t)$ with increasing

[Continuation of BEIJINGDAXUE XUEBAO ZIRAN KEXUEBAN No 3, 1981 pp 30-39]

failure rate $r(t)$, then we have the following conclusions:

1) If t is a continuous point of $r(x)$, $t \in (0, T)$, then

$$P \{ \lim_{t \rightarrow t} \hat{r}_n(t) = r(t) \} = 1$$

2) If $r(t)$ is continuous on (a, b) ($0 < a < b < T$), and a, b are both continuous points of $r(t)$, then

$$P \{ \lim_{t \rightarrow t} \sup_{t \in (a, b)} |\hat{r}_n(t) - r(t)| = 0 \} = 1$$

3) If $b \in (0, T)$, then

$$P \{ \lim_{t \rightarrow t} \sup_{t \in (0, b)} |\hat{R}_n(t) - R(t)| = 0 \} = 1$$

where $R(t) = 1 - F(t)$.

AUTHOR: ZHANG Jinyan [1728 6930 3508]

ORG: Department of Mathematics

TITLE: "Loss of Stability and Bifurcation (Dimension 2)"

SOURCE: Beijing BEIJINGDAXUE XUEBAO ZIRAN KEXUEBAN [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 3, 1981 pp 40-42

TEXT OF ENGLISH ABSTRACT: The relationship between bifurcation and loss of stability is established as the following theorem:

Consider the system

$$\begin{cases} \dot{x} = P(x, y, \lambda) \\ \dot{y} = Q(x, y, \lambda) \end{cases} \quad (1)_{\lambda}$$

where P and Q are analytic. If the origin $(0, 0)$ is a stable (unstable) focus of center type of the system $(1)_0$, and unstable (stable) focus of the system $(1)_{\lambda}$ with $\lambda > 0$, then for the system $(1)_{\lambda}$ with sufficiently small $\lambda > 0$, there exists at least one stable (unstable) limit cycle in the neighborhood of $(0, 0)$.

AUTHOR: YANG Fuqing [2799 5346 3237]
JIN Dexin [6855 1795 9515]
ZOU Yue [6760 1878]
ZHU Huizhen [2612 1979 4176]
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ORG: YANG, ZOU, ZHU and SU all of the Department of Computer Science and Technology, Beijing University; JIN of the Shanghai Computer Factory

TITLE: "On the Design and Implementation of a Modular Operating System"

SOURCE: Beijing BEIJINGDAXUE XUEBAO ZIRAN KEXUEBAN [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 3, 1981 pp 43-46

TEXT OF ENGLISH ABSTRACT: In this paper some problems, including structural design, resource management, path communication and system description, are presented. It is noted that these problems should be taken into consideration in the design and implementation of a modular operating system.

AUTHOR: YANG Fuqing [2799 5346 3237]
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ORG: Both of the Department of Computer Science and Technology

TITLE: "Kernel of a Modular Operating System"

SOURCE: Beijing BEIJINGDAXUE XUEBAO ZIRAN KEXUEBAN [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 3, 1981 pp 47-57

TEXT OF ENGLISH ABSTRACT: In this paper, a kernel of the modularized operating system which is designed with the modular design method PCM is presented. Its function and structures are described. Some procedures which are written in the system programming language XCY are given.

This kernel consists of some monitor malules which have improved the clarity, simplicity and reliability.

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ORG: JIN of the Shanghai Computer Factory; YANG and ZOU both of the Department of Computer Science and Technology, Beijing University

TITLE: "Concurrent Processes of a Modular Operating System"

SOURCE: Beijing BEIJINGDAXUE XUEBAO ZIRAN KEXUEBAN [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 3, 1981 pp 58-67

TEXT OF ENGLISH ABSTRACT: In this paper, the multiprogramming management technique, the concurrent processes among devices and the concurrent processes modules are discussed from the view of the structural design method PCM. The implementation of the procedures concerned which are written in the system programming language XCY are reported.

AUTHOR: ZOU Yue [6760 1878]
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TITLE: "The Device and File Management of a Modular Operating System"

SOURCE: Beijing BEIJINGDAXUE XUEBAO ZIRAN KEXUEBAN [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 3, 1981 pp 68-77

TEXT OF ENGLISH ABSTRACT: A file system of the modularized operating system DJS 200/XT2, which is designed with the modular design method PCM is presented. The method and implementation of device resources classification and hierarchical management also are discussed.

AUTHOR: WANG Gongben [3769 2396 2609]

ORG: Department of Computer Science and Technology

TITLE: "Cyclic Hamming Error-correcting Codes and Their Applications in Computer Systems"

SOURCE: Beijing BEIJINGDAXUE XUEBAO ZIRAN KEXUEBAN [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 3, 1981 pp 78-87

TEXT OF ENGLISH ABSTRACT: In this paper a class of error-correcting codes called "cyclic hamming error-correcting" codes (CHEC) is developed. Such codes can be widely used for error correction and detection for computer systems, especially for high-density magnetic tape. CHEC can be used to correct all single-error bursts and to detect 98.64 percent of all possible double bursts, which is much better than CRC, for example, which detects only 89.96 percent of all possible double bursts. The accuracy of CHEC has been confirmed in a magnetic tape.

AUTHOR: ZHANG Haifan [1728 3189 5672]

ORG: Department of Computer Science and Technology

TITLE: "An Efficient Approach to Optimal Automatic Routing of Printed Circuit Boards"

SOURCE: Beijing BEIJINGDAXUE XUEBAO ZIRAN KEXUEBAN [ACTA SCIENTIARUM NATURALIUM UNIVERSITATIS PEKINENSIS] in Chinese No 3, 1981 pp 88-96, 77

TEXT OF ENGLISH ABSTRACT: In this paper the optimal ordering algorithm and the theorems determining the minimal track number used in the routing of one class of specific net sets are first given. Then the necessary and sufficient conditions using minimal track number T_0 for the routing of general net sets is given. The corresponding ordering algorithm is also given: the general net set is first decomposed into some "macro subsets," then according to the above necessary and sufficient conditions the nets of macro subsets are ordered. Thus the routing is optimal, that is the track number used in the routing is minimal. Finally an interpretation of the obtained result from the viewpoint of graph theory is given.

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CSO: 4009/79

Physics

AUTHOR: ZHANG Kaiming [1728 7030 2494]
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TITLE: "Electronic States of Li-GIC"

SOURCE: Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTOR] in Chinese
No 4, Nov 81 pp 249-262

TEXT OF ENGLISH ABSTRACT: A cluster model is proposed. The most stable geometry of LiC_6 is determined by minimizing the total energy of the cluster calculated by the charge self-consistent EHT method. The charge transfer between Li and C and the density of states are calculated. It is found that LiC_6 is a donor compound with metallic properties. According to the SCF charge transfer, the modified ionization energy of different atoms in the cluster can also be worked out and can be used as parameters for the tight-binding band-structure calculation. In parallel with the TB method, Green's function method is also used for qualitatively analyzing the electronic states contributed from Li and C.

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TITLE: "Investigation of the Localized States in Amorphous Silicon Films Using the Field Effect"

SOURCE: Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTOR] in Chinese
No 4, Nov 81 pp 263-266

TEXT OF ENGLISH ABSTRACT: The energy distribution of the gap state density $N(E)$ in undoped CD a-Si films has been measured by the field effect technique. The effects of different deposition conditions and annealing temperatures on $N(E)$ are compared.

AUTHOR: GAO Weibin [7559 4850 3453]
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ORG: All of the Institute of Semiconductors, Chinese Academy of Sciences

TITLE: "A Study of Defects in GaAs Substrates and GaAs-Al_xGa_{1-x}As DH Epitaxial Wafers by X-ray Topography"

SOURCE: Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTOR] in Chinese No 4, Nov 81 pp 267-272

TEXT OF ENGLISH ABSTRACT: Defects in GaAs substrates and GaAs-Al_xGa_{1-x}As DH (double heterostructure) epitaxial wafers have been observed by means of transmission X-ray topography. High resolution X-ray topography and metallographic techniques prove that the contrast in X-ray topographic photos is produced by crystal defects. An evaluation for the density of the defects in GaAs substrates and GaAs-Al_xGa_{1-x}As DH wafers is given according to the X-ray topographic photos.

The stripe lasers have been made by conventional LPE (liquid phase epitaxy) and proton bombardment. Measurement of the characteristics of the lasers shows that the device yield and quality correspond to our evaluation from X-ray topography for the density of the defects in the substrates and epitaxial wafers.

AUTHOR: LIANG Jingguo [2733 7234 0948]
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ORG: All of the Department of Physics, Beijing University

TITLE: "TEM Study of the Configurations of Dislocations in LPE Ga_{1-x}Al_xAs Layers"

SOURCE: Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTOR] in Chinese No 4, Nov 81 pp 273-276

TEXT OF ENGLISH ABSTRACT: The configurations of dislocations in LPE Ga_{1-x}Al_xAs layers have been observed by HVEM. TEM observations show that in the LPE layer there are some dislocation nets which are distributed inhomogeneously, many dislocation loops which are scattered in the dislocation nets and have different sizes, and dislocation clusters which are generated by inclusions. Models for the generation of the configurations of dislocations are discussed. Isolated stacking faults have also been observed.

AUTHOR: WANG Yongchen [3769 3057 2525]

ORG: Tianjin Electronic Materials Research Institute

TITLE: "Study of the Width of the Transition Region between GaAs Active and Buffer Layers Grown by VPE"

SOURCE: Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTOR] in Chinese No 4, Nov 81 pp 277-287

TEXT OF ENGLISH ABSTRACT: A mathematical drift-diffusion model is used for the graded doping of double-layered VPE GaAs, from which the initial and final profiles of the impurities in active layers have been calculated, and an analytical solution for the width of the transition region is obtained. The theoretical results are in good agreement with experimental results.

The distribution coefficient of Sn in the gas-solid phase of the VPE GaAs has been experimentally measured. The formula for the theoretical calculation of the concentration is finally given.

AUTHOR: MA Xinrong [7456 9515 2837]
TIAN Lilin [3944 4539 2651]
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ORG: All of the Institute of Microelectronics, Qinghua University

TITLE: "A Study on the Instability of the $C(t)$ Characteristics of P-Si MOS Structure"

SOURCE: Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTOR] in Chinese No 4, Nov 81 pp 288-297

TEXT OF ENGLISH ABSTRACT: The instabilities of $C(t)$ and $C(V)$ characteristics of P-Si MOS structures have been experimentally studied in detail. A physical model, which explains the observed phenomena satisfactorily, is proposed. The method of boron implantation into Si in the region around the polysilicon gate proved useful in avoiding these instabilities. The experiment also revealed that, in this case, a suitable treatment of the samples is required in order to determine the minority carrier lifetime accurately by use of the $C(t)$ method.

AUTHOR: MA Xinrong [7456 9515 2837]
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ORG: All of the Institute for Microelectronics, Qinghua University

TITLE: "Simultaneous Determination of the Bulk and Surface Layer Lifetimes of Minority Carriers in a Semiconductor Using the $C(t)$ Characteristics of MIS Structures"

SOURCE: Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTOR] in Chinese
No 4, Nov 81 pp 298-306

TEXT OF ENGLISH ABSTRACT: When traps of high recombination ability exist in the surface layer of a semiconductor, the Zerbst formula needs some modifications. The modified formula reveals that the Zerbst plot is no longer a straight line. Using the $C(t)$ characteristic and the modified formula one can simultaneously determine both the surface and the bulk minority carrier lifetimes, as well as the approximate depth of the high recombination surface of the semiconductor. The good agreement between experiment and theory proves that our modification is successful.

AUTHOR: YU Guangao [0205 0385 7559]
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ORG: All of Nanjing Solid State Device Institute

TITLE: "Doping Profile and I-V Characteristic Analysis for Hi-Lo GaAs IMPATT"

SOURCE: Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTOR] in Chinese
No 4, Nov 81 pp 307-316

TEXT OF ENGLISH ABSTRACT: The breakdown voltage V_g of experimental diodes varies appreciably due to the nonuniformity of concentration and thickness of multilayer epitaxial materials. For this reason an analysis and calculation of V_g , the width of the depleted region and the electrical field profile for a given impurity profile are presented here. The experimental I-V characteristics relative to the impurity profile at room temperature were found. Thus, in practice, chips may be selected according to the breakdown voltage value and the shape of the I-V characteristic curve at high current density. This method of selecting chips has been applied to batch production.

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CSO: 4009/129

Physics

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TITLE: "Different Phases and Resonance Line Shifts in Magnetic Superconductors"

SOURCE: Beijing DIWEN WULI [ACTA PHYSICA TEMPERATURAE HUMILIS SINICA] in Chinese No 3, 1981 pp 173-182

TEXT OF ENGLISH ABSTRACT: In this article we discuss the various phases of magnetic superconductors. Coupled equations for the magnetic and superconducting order parameters are derived and are used to investigate the conditions under which different phases appear. The frequency shifts of magnetic resonance lines brought about by phase changes are also studied.

AUTHOR: XING Dingyu [6717 1353 6877]
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ORG: Both of the Department of Physics, Nanjing University

TITLE: "Proximity Effects of Superconducting-Normal Interface"

SOURCE: Beijing DIWEN WULI [ACTA PHYSICA TEMPERATURAE HUMILIS SINICA] in Chinese No 3, 1981 pp 183-193

TEXT OF ENGLISH ABSTRACT: Proximity effects of superconducting-normal interface have been studied by using the S-N interface Green's function obtained in our previous work. The superconductive order parameters on both sides of the interface exhibit a spatial variation. Its extended distances from the interface are of the order of coherence length. Furthermore, two points are worth mentioning: 1) the order parameters are frequency dependent complex quantities and present an oscillatory behavior; 2) gapless regions may appear in the immediate neighborhood of the interface.

AUTHOR: ZHANG Xudong [1728 2485 2639]
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ORG: All of Baoji Nonferrous Metals Institute

TITLE: "The Explosive Bonding of NbTi-Cu Multifilament Superconductors"

SOURCE: Beijing DIWEN WULI [ACTA PHYSICA TEMPERATURAE HUMILIS SINICA] in Chinese
No 3, 1981 pp 194-201

TEXT OF ENGLISH ABSTRACT: The technology of explosive bonding and properties of sample joints of NbTi-Cu multifilament superconductors are reported in this paper. The explosive bonding device and experiments carried out for determining the making-up prescription and bonding parameters are described. A number of explosive bonding experiments were carried out with superconductors of two kinds of cross sections (7×3.6 mm, Cu:NbTi = 10,204 filaments and 3.6×1.8 mm, Cu:NbTi = 5,174 filaments). The bonded superconductive joints are satisfactory. Excellent metallurgical bonding is found in all units including the NbTi filaments. After some easy repairs, the size and shape at the position of the joint are the same as that of the superconductor body itself. The joints have excellent bending properties and high tensile strength (33.1 kg/mm^2 at room temperature and 43.6 kg/mm^2 liquid nitrogen, corresponding to 97.3 and 100 percent of the tensile strength of the superconductor at the same conditions respectively). The superconductive

[Continuation of DIWEN WULI No 3, 1981 pp 194-201]

joints with the cross section of 3.6×1.8 mm (at 4.2 K, 5T) have the critical current of 1801 A, corresponding to 90 percent of that of the superconductor at the same conditions. The research results can be applied to the field of bonding the superconductors of the similar cross sections.

AUTHOR: None

ORG: Low Temperature Specialty Superconduction Group, University of Science and Technology of China; Group No 307, Institute of Plasma Physics; Shanghai Institute of Nonferrous Metals, Chinese Academy of Sciences

TITLE: "The Dynamic Stability in CVD Nb₃Sn Superconducting Tapes"

SOURCE: Beijing DIWEN WULI [ACTA PHYSICA TEMPERATURAE HUMILIS SINICA] in Chinese No 3, 1981 pp 202-211

TEXT OF ENGLISH ABSTRACT: The dynamic stability in CVD Nb₃Sn superconducting tapes has been studied both theoretically and experimentally. In consideration of a two-dimensional model, the stability criterion has been found to be

$$J_c \leq \frac{hT_0}{b\rho_{Cu}} \cdot \frac{(1-\eta)(1+\omega\eta)}{\eta^2},$$

where η is the volume fraction of the superconductor, ω is a parameter characterizing the superconducting tape geometry and the cooling condition. Using the above criterion, we show that there exists an optimum copper-clad thickness which has maximum overall critical current density. This thickness is determined by the expression

$$\eta_{or} = \frac{\omega - 2\xi - 1}{(\xi + 2)\omega - \xi},$$

[Continuation of DIWEN WULI No 3, 1981 pp 202-211]

where ξ is the ratio of the thickness of the matrix to that of the superconductor. We have discussed the effects of the conductor geometry, thickness of copper clothing d_{Cu} , condition of cooling, applied magnetic field and transport current on the stability. With d_{Cu} reaching a certain value, a transition is made from dynamic stability to cryostatic stability. The theory is in good agreement with the results of the experiments by using simulation coils.

AUTHOR: None

ORG: Nb₃Ge Research Group, Changsha Research Institute of Mining and Metallurgy, Ministry of Metallurgical Industry

TITLE: "Preparation of Nb₃Ge by a Continuous CVD Process"

SOURCE: Beijing DIWEN WULI [ACTA PHYSICA TEMPERATURAE HUMILIS SINICA] in Chinese No 3, 1981 pp 212-218

TEXT OF ENGLISH ABSTRACT: This paper describes some preliminary studies of the preparation of the superconducting Nb₃Ge tape by using a high-speed and multilayer continuous CVD process. The Nb₃-Ge films were deposited on the Hastelloy B substrate at the tape speed of 15-23 m/hr by simultaneous hydrogen reduction of NbCl₅ and GeCl₂ vapor. Sample Nb₃Ge tapes of 2.5 mm in width and with the films on each side 5 μm thick has been prepared with A 15 Nb₃Ge as the major phase in the deposit. The sample as a T_C onset of 21.0 k and a T_C midpoint of 19.0 k, and its values of I_C and J_C (Nb₃Ge) have reached 115 A and 4.6 x 10⁵ A/cm² at 4.2 K and 4 T, respectively. Some technological problems of improving the continuous CVD process for preparing practical Nb₃Ge tapes are discussed.

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YANG Tingping [2799 1694 5493]
TONG Husong [4547 4375 1529]
et al.

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TITLE: "A Study of Manufacturing Superconducting Wire from Nb₃(Al_{0.75}Ge_{0.25}) Powder"

SOURCE: Beijing DIWEN WULI [ACTA PHYSICA TEMPERATURAE HUMILIS SINICA] in Chinese No 3, 1981 pp 219-225

TEXT OF ENGLISH ABSTRACT: A process for manufacturing superconducting wires by drawing A-15 compound powder in copper tubing was proposed and tried out. Such φ0.3 mm wires containing Nb₃(Al_{0.75}Ge_{0.25}) powder were made with a resulting overall conductor current density J_C = 6.7 x 10⁴ A/cm² (4.2k, 7T) and a superconducting transition temperature T_C = 18.3 K, and with a good flexibility. Such a process could be applied to those A-15 superconducting compounds which have the stoichiometric composition A₃B and, at the same time, are stable in phase diagram and/or metastable after fairly rapid cooling.

AUTHOR: ZHANG Xuehua [1728 1331 5478]
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TITLE: "Preparation and Analysis of Superconducting Nb-Ge Films by EBCE Technique"

SOURCE: Beijing DIWEN WULI [ACTA PHYSICA TEMPERATURAE HUMILIS SINICA] in Chinese No 3, 1981 pp 226-234

TEXT OF ENGLISH ABSTRACT: Experiments on electron beam co-evaporation were made on Nb-Ge in the substrate temperature range of 750-1050°C. The Nb-Ge films with higher critical temperature of 20-21.9 K can be deposited on the substrate by evaporation at 800-950°C under pressures of 10^{-5} - 10^{-6} Torr with the deposition rate of a few Å/s. The X-ray diffraction patterns indicate that there predominantly exists an A15 structure phase and some other phases in the films. The dependence of T_c on the chemical composition, resistance ratio and lattice parameter has been studied. It is also revealed that the rich Ge films which deposit under higher temperatures exhibit T_2 phase with tetragonal structure, while those which deposit

[Continuation of DIWEN WULI No 3, 1981 pp 226-234]

under lower temperatures exhibit T phase with hexagonal structure. It is suggested that the surface states of the substrate may have some effects on the formation of the metastable A15-Nb₃Ge films.

AUTHOR: LIU Zhiyi [0491 1807 3015]
WANG Shouzheng [3769 1343 6214]

ORG: LIU of the Institute of Physics, Chinese Academy of Sciences; WANG of the Department of Physics, Beijing University

TITLE: "The Preliminary Study on the Superconductivity of the Rare Earth La and Its Compound La_3In "

SOURCE: Beijing DIWEN WULI [ACTA PHYSICA TEMPERATURAE HUMILIS SINICA] in Chinese No 3, 1981 pp 235-239

TEXT OF ENGLISH ABSTRACT: The rare earth element La with purity of 98.0 percent is used to prepare its alloy La_3In by using the livatation melting method, with T_C being 8.9 K. The effects of the high-speed liquid-phased cooling and the existing oxidation on La and La_3In T_C have been observed.

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TITLE: "The Effects of Sample Dimension in the Impact Test at Low Temperatures"

SOURCE: Beijing DIWEN WULI [ACTA PHYSICA TEMPERATURAE HUMILIS SINICA] in Chinese No 3, 1981 pp 240-247

TEXT OF ENGLISH ABSTRACT: The present paper deals with the rules of variation in impact work with temperature and the width of samples, from room temperature to -196°C . The samples tested were either U-notched or V-notched 1Cr18Ni9Ti Osmondite stainless steel, pure Al, 20 and 45 fine carbon steel, with four sample widths of 10, 7.5, 5 and 2.5 mm. A formula is presented for conversion of the impact work between the standard samples and the nonstandard ones. A curve of the change in impact work with temperatures and a table of conversion coefficients of equivalent impact work between the standard and nonstandard samples are given in the paper.

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TITLE: "The Development of a Rhodium-Iron Resistant Thermometer"

SOURCE: Beijing DIWEN WULI [ACTA PHYSICA TEMPERATURAE HUMILIS SINICA] in Chinese No 3, 1981 pp 248-257

TEXT OF ENGLISH ABSTRACT: Our paper presents the development of a standard rhodium-iron resistant thermometer for laboratory use and a general one for industrial use, gives the measurement principles and the results of the characteristic measurements, and includes the materials used for the thermometers, their structure, stability, resistance-temperature characteristics, sensitivity, magneto-resistance effects, self-heating effects and an analysis of errors, etc. The calibrated data are

[Continuation of DIWEN WULI No 3, 1981 pp 248-257]

treated by computers. A simple method of interpolation of a referential function table within the range of 2-273 K is recommended. A comparison of this thermometer with the British one is made.

AUTHOR: YANG Chunjiang [2799 2504 3068]

ORG: Shanghai Institute of Technical Physics, Chinese Academy of Sciences

TITLE: "A Practical Method of Calculating Shuttle Heat Transfer in a Refrigerator"

SOURCE: Beijing DIWEN WULI [ACTA PHYSICA TEMPERATURAE HUMILIS SINICA] in Chinese
No 3, 1981 pp 258-262

TEXT OF ENGLISH ABSTRACT: In making designs of reciprocating refrigerators, a simplified equation has been used for calculating shuttle heat transfer. However, neglect has been shown of the effects on a few important parameters, such as physical properties of the walls and motion cycle of the displacer. An improved equation is derived.

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TITLE: "Superconducting Chopper"

SOURCE: Beijing DIWEN WULI [ACTA PHYSICA TEMPERATURAE HUMILIS SINICA] in Chinese
No 3, 1981 pp 263-266

TEXT OF ENGLISH ABSTRACT: This paper introduces the manufacturing technology and the main characteristics of a superconducting chopper. The optimum frequency of it is 100-300 Hz, and its sensitivity is less than $9 \times 10^{-9} \text{V}$.

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